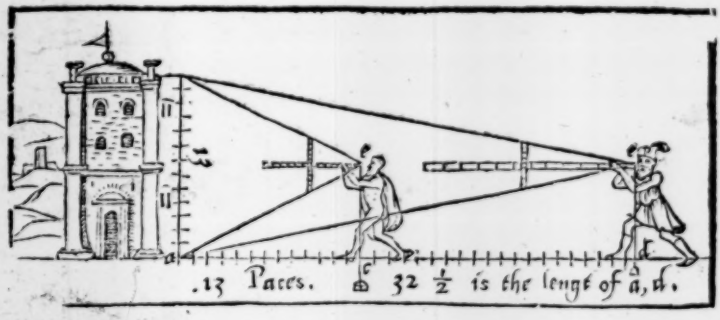
A BOKE NAMED
TECTONICON.

Briefly ſhewinge the exacte meaſuring, and ſpe-
dye reckonynge all maner of Lande, Squares, Tymber, Stone, Steaples, Pyllers, Globes &c. Further, declaringe the perfecte makinge and large vſe of the Carpenters Ruler, contayninge a Quadrante Geometricall, comprehendinge alſo the rare vſe of the Squire. And in thende a lytle Treatiſe adioyned, openinge the compoſition and appliancie of an inſtrument called the profitable Staffe With other thinges pleaſaunt and neceſſarye, moſt conducible for Surueyers, Landemeaſters, Ioynters, Carpenters, and Maſons.

¶ Publiſhed by Leonarde Digges Gentleman,
in the yeare of our Lorde.
1556.



Imprinted at London in Fleteſtreate
neare to S. Dunſtones Churche,
by Thomas Marthe.

Anno. 1570.

L. D. vnto the Reader.

ALthough (gentle Reader) manye excellent in Geometry, vpon infallyble grounds haue put forth diuerse most certaine and sufficient rules, touching the measuringe of all maner Superficiecis: yet in that the arte of numbringe hath bene required yea chiefelye those rules hid, and as it were locked vp in straunge tongues (they do profite, or haue furdered very lytle the most parte: certes nothing at all, the Landemeater. Carpenter, Masou, wantinge the aforesaide for their sakes I am here prouoked not to hide, but to open, and so encrease the talent which I haue receyued, yea, to publishe in this our tongue very shortlye, if God geue life, a volume contayninge the flowers of the Sciences Mathematicall, largely applyed to our outward practise, profitablye pleasaunte to all maner mẽ of this Realme In the meane time I shall desire the Artificers aboue named to be contented with this litle Booke, a tast of my good will towards thẽ, which I wishe euen so to forder the readers, as I know it sufficient for the true measuringe and redy accompt of all maner Lande Tymber, Stone, Borde, Glasse. Pauement &c.

Here mine aduise shal be to these Artificers that will profite in this, or any of my bookes, now published, or that hereafter shalbe, first confusely to reade them thorow, then with more iudgement. Read at the thirde readinge wittelye to practise. So fewe things shalbe vnknowen. Note, oft diligent reading, ioyned wyth ingeniouse practise, causeth profitable laboure.

Thus most hartely farewell (louinge Reader) to whom I wishe my selfe present to further thy desire and practise in these.

The pleaſant profite, or content of this litle boke

And in what it exceedeth all other publiſhed.

OTher Bookes tofore put forth in our Engliſhe tongue contayued onely the bare meaſuringe of Lande, Timber, and Borde, howe agreable in al places to the rules of Geometry, let the learned iudge. Here (gentle Reader) thou ſhalt plainly perceiue throwe diligente reading, how to meaſure truly and very ſpedely all maner Lād, Timber, Stone, Steples, Pillers, Globs, Bord, Glaſſe, Pauemēt, &c. without trouble, not payned with many rules, or obſcure termes. Nor yet with the multitude of tables, as here before haue bene: in whiche not a fewe errours were committed: for that cauſe no iuſt accompt might any way be had: Further ye ſhal by this Booke vnderſtand the whole making and comlye handelinge of the Carpenters Ruler, with the true meaſure &c. And his vſe appointed to the readye meaſuringe of all kind of Timber, Stone, Borde &c. Alſo the leauelinge of groundes, taking of Heightes, is pleaſauntly and diuerſly practiſed by the ruler Ye haue here not the common but the rare vſe of the Squire applied to Heights, Lengthes. &c. and to the findinge of the iuſt houre of the day diuers wayes: throughe the ayde of pleaſaūt tables, newly adioyned to my generall Prognoſtication, by the whiche the proportion of thinges direct or ſquirewiſe ſtanding, are by their ſhadowes knowen.

To conclude, in the ende of this Booke is added a Treatiſe ſhewinge the makinge and vſe of an inſtrument, by Which ye ſhall get lengthes, Heightes, Breadthes, Wideneſſes, where, or howe ſoeuer they ſtande.

Other neceſſarye thinges are contayned in this litle volume Which I commit to the diligente [illegible]

Diuerſe thinges conducible, to the arte of meaſurynge.

THE I. CHAPTER.

AS there are few craftesmen which haue all the kyndes of Arithmetike readelye: ſo I doo ſuppoſe none ſo ignorannte but that they doo, or manye eaſely perceyue the ſymple ſignification of theese Caracters or fygures. 1.2.3.4.5.6.7.8.9.0. and alſo their ſtrength in the firſt, ſecounde, and thirde roume placed.

Characters numerall

Beſydes that, they muſte be familier with theſe and ſuch lyke Fractions.

Fractions.

1 1 1 1 3 4 9 2 3 7 16 32 4 5 10 The firſte leftewarde betokeneth one ſecond part of an whole, be it pearche Inche, or anye other meaſure: the nexte, one third, then one ſeuenth parte: the other enſuyng, one fyrtenth. So one thirty and two partes of an Inche. Then foloſ thre fourthes: foure fifthes. The laſt is nine tenthes of an Inch: that is nine partes of an Inch diuided into ten portions.

Theſe I dooe intende to put in my enſamples, and in my tables & margines folowyng to repreſent partes of Pearches or Inches. As if I would write halfe an Inch, after this maner ½. Thre quarters of an Inche, thus. ¾. One eight part of a Pearche, on this wiſe ⅛. So of the reſt.

¶ It is requiſite alſo here to open what a Pearche, a Day worke, a Roode, and an Acre is.

Although there are diuers opinions engendred throughe longe cuſtome in many places, of the length of a Pearch (vpon which our chiefe matter dependeth) yet there is but one true Pearche by Statute apoynted to meſur by. Wherin is ordeyned. 3. barly cornes, dry, and round, to make an Inche. 12. Inches, a foote. 3. Foote, a Yarde 5. yardes and. ½. a Pearche: 40. Pearches in length, and 4. in breadth, an acre.

So an Acre by ſtatute ought to cõteine. 160. pearches the halfe Acre. 80. pearches: a Roode commõly called a quarter. 40. pearches, a day worke 4. pearches. Lo, here the Acre expreſſed with his length and breadthe.

	Acre.	
1.		160.
2.		80.
4.		40.
5.		32.
8.		20.
10.		16.

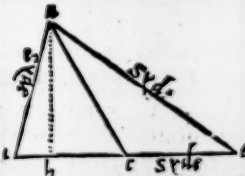
Breadthe. Lengthe.

Instrumēts to measure with poules Cord knotted Profitable staffe.

I must not omit here to tel you what thing is meetest to measure land with. They vse commonly in the countrey, two poales, either of thē the length of a pearch. They are very good. Yet for all kynde of land, a corde 5. pearches in length. wel seared with ware & rosen, knotted or marked at the end of euery pearche, is more mete & readier. But in my fantasy, the Instrument Geometricall, whiche is put forth in thēd of this boke, passeth al them & other, for the eracte truth and quickest spede. This instrument is so general & auaylable to so ‘und’ry thinges, that it alone requireth a large boke, if it shold be sufficiently set forthe.

Triangle.

Also I wouldе not haue you ignorant what pece of land is called a Triangle, which often shall hereafter benamed. It is suche a fashioned piece as hath, or is imagined to haue three sydes, & three angles onely:



Line falling squirewise.

whether ỹ sides be equall or otherwise, as this figure sheweth. Again note that a lyne is sayd to fal squirewise, when it cutteth any thyng, or any side of a Triangle full crosse, lyke vnto a squire: As the hangyng pricked line a.b. in c.d. the base line of the Triangle.

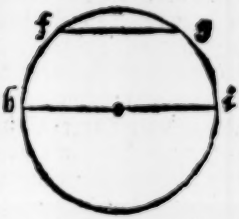
Base line.

Loe, it cutteth the syde squirewise, or ful crosse, in the pointe b. and not as the other lyne a.e dooeth. The Base of any triangle is here called that syde, which is cut squirewise of the hangyng lyne.

Circle.

Concerning a Circle, knowe that the compasse of anye circle, is named his circumference: the middle pointe in him his Centre: the

Circūferēce
Centre.
Diametre.
Semediametre.
Arcke.
Pararelleles



ryght line b.i. that goeth ouerthwart that Centre, touchynge the circumference on bothe sydes, is his Diametre: the halfe of that line, ỹ Semidiametre. Also an arcke is a pece of the circumference cut awaye, as ye ỹ arcke aboue the lyne f g. Also. f. g & h.i. in this circle are named Parallels: for that they differ equally in all places, the one from the outhe.

Note because practyse and experience sheweth me, that there is almoste no lande, but it maye easely be broughte by imagination, to a Triangle or Triangles, and so moost truelye mesured: therfore to be shorte, thys order shalbe taken. I wyll fyrste fygure and set afore your eyes Triangled Lande, and other, which by imagination

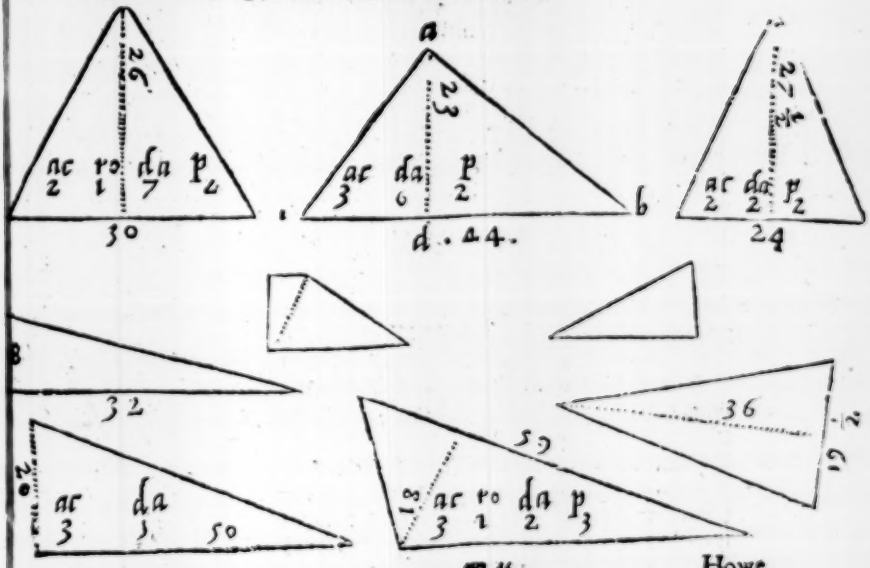
gination shalbe brought into triangles. Thē I shall teach the true measuryng of them: I meane how to fynde a lēgth & breadth, with which ye shal enter the Table of accompte folowyng, where the acres, and odde pearches, if there be any, shall appeare. As these fygures are measured, so all tryangled land, and other brought into tryangles, of what fashion soeuer they be, shalbe measured And because it is requisite for true measuring of all triangles, to fynde a streight hangyng lyne, I shall shewe firste howe that Lyne is to be founde, imagined, or drawen.

Howe the right hanging line in Triangles is drawen.

THE. II CHAPTER.

THis streight hangyng lyne in all Triangles, is euer drawen or imagined frō any Angle, cutting some one syde of that triangle squire wyse: as ye may perceyue the pricked lines in the triangles folowyng. By the helpe of this lyne, al landes of triāgle fashion, are brought to be measured as ensueth

To drawe a hanging or plūbe line.



Howe to measure all maner Triangled Lande.

THE III. CHAPTER.

Builde the firste boke 41. Pro.

IF thou be an Arithmetrician multiplie this streight hanging line, drawen as aboue is shewed, in halfe the nũber of pearches of that syde whiche it cutteth squarewyse. For want of that knowledge, take the aforenamed pearches (I meane of the hanging lyne, and halfe ẏ syde which he cutteth) & with that length and breadth enter your table of accompte, as there is set forthe. So shal ye perceaue the number of Acres, Rodes, Daye worckes, &c.

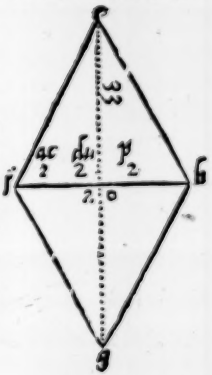
Ensample.

FOr the perfecte measuryng of triangles afore sygured, and al other, suppose the secõd of these last. 9. sygures on thother side, hauing written about it. a.b c.d to be a pece of lande wherof I would haue the true measure I synde by a corde or otherwyse, the pricked hangyng lyne. a.d. to be. 22 Pearches. the syde b c. which it cutteth squirewise. 44. Pearches. whose halfe is. 22. With these. 22 & 23. the conuenient length & breadth, I enter the table of accõpte. There I synde by that table, at the corner where both the lynes of conuenient length and breadth do mete. 3. Acres. 6. daye worckes, & 2. Pearches to be in that Triangle. Thus of all before sygured.

This Table foloweth.

Here note your Table must ever be entred with al the pearches of the hangyng Lyne, and with halfe the syde that he cutteth squirewyse: Or with the halfe hangyng lyne, and the whole syde cut.

A figure of a double Triangle.

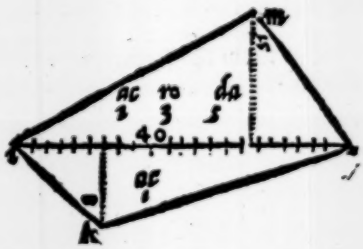


THis sygure e.f.g h. is but two Triangles: and therfore measured as aboue in two partes. Or thus. The hangynge lyne, e.g. is. 33. Pearches: the side. f.h. that he cutteth squirewise. 2 . Pearches, the halfe of the which is. 10. Now enter your Table as afore, with 33. and. 10. the conuenient length the breadthe So shall ye synde. 2. Acres. 2 daye woorkes and 2. Pearches, the true contente of this sygure. e.f.g.h.

An

An other enſample.

Admitte. i. k. l. m, lãd to be meaſured. Becauſe it is no maner Triangle, it muſt be brought by imaginatiõ, as I haue ſaid, in. o a triangle or triangles. Which imaginatiõ is here ſig-



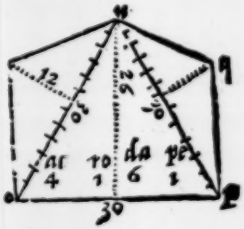


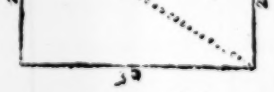
Figure of many Angles.

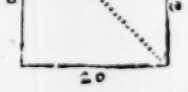
nified by the lyne dached i. l. When as aboue is declared, it oughte to be meaſured (according to the rule of Triangles) in two partes, becauſe there are two triangles in that lande. So by proſe ye ſhall fynde in the vpper i. m. l. one Acre 3. Rodes and 5. day worke: in the other i k l one Acre. Thus I gather the whole content of that land to be 2 Acres 3 Roodes, and 5 Dayworkes.

None otherwiſe of the adioyned n o p q and al other fygures folowyng, and other whatſoeuer they are, that by any meanes maye be brought into triangles.

Furthermore know, that the fygure i k l m is readely thus meaſured. Adde the pearches of both the hangynge lynes togeather: ſo haue ye 23. With this number, and with halfe the pearches of the ſyde i l. whiche be cutteth ſquarewiſe, beynge 20 pearches, enter youre table: & is founde as afore.

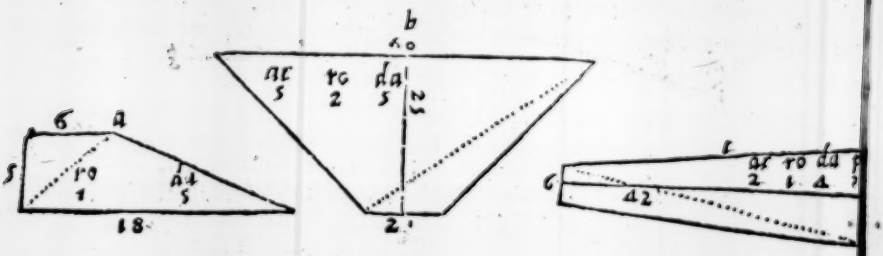
These two figures folowynge may alſo be thus meaſured, otherwyſe then by the rule of Triangles. Enter youre table with theyr conuenyente lengthe and breadthe. So ſhal ye fynde the content of all ſuche.





These three figures following, although they may be measured by the rule of triangles, yet for quicker spede, they haue also their proper measuryng as ensueth.

Laye together the two sydes whiche are psralleis of the first figure a. that is 6 and 18. makynge 24. the halfe is 12 the breadthe 5. Enter with 5. and 12. your table. So haue ye one rode, and fiue day worke. For the other two b. c. and suche lyke, ioyne the heades or endes in one: and enter your table with halfe of those pearches, and with the whole number of the middle lyne.



Howe by supputation to measure all Triangled Landes.

To measure triāgled lād by supputation.

Ioyne all the sydes togeather: take halfe: oute of that halfe pulle euery syde, notyng the difference Then multiply the differēces the one in the other and the thirde difference augmente in the product. That which encreaseth, multiply in the halfe of all the sydes ioyned. Then ỹ Radix of the surmounting summe is the cōtent of that Triangle.

Foure rules folowyng.

Nowe rest foure rules to be treated of. The first for all maner regular square Superficies. The second for rounde lande, and ber partes. The third for Steples, Colūnes, Globes, and theyr parts. The last for Mountaynes and Valleyes. Here they shall in order followe.

A rule

A rule for all maner regular or right squared Lande of many sydes, as, 5.6.7.8.9.10.20.100.&c.

THE LIII. CHAPTER

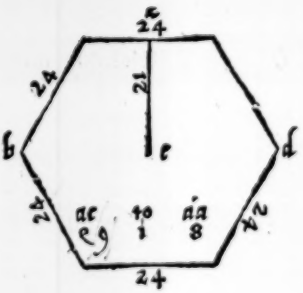
MEasure and laye all the sydes together, takyng the halfe nũber of Pearches there conteyned. Then drawe a right hangynge lyne from the centre or myddes of that sygure, or the middes of some one syde. And with that lengthe and the other, enter youre Table. Note that the Triangle of all sydes lyke, and the Quadrate sygure are also measured by this rule.

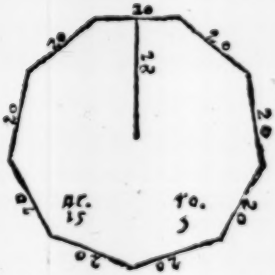
To measure lande of many sydes.

Ensample.

SUppose this figure. a. b. c. d. to be syxesquare pece of lãd and euery syde. 24. pearches. The halfe summe of all sydes is. 72. pearches: the right hangyng pricked line. a c. 21. Pearches With these two numbers ye muste enter youre table of accompt folowyng herafter. And do as is opened in the declaration there adioyned, when numbers surmount the Table as thy do here.

So shall ye fynd. 9. Acres 1. Roode, and 8. Daywerkes, the cõtent of this sygure. a. b. c. d. Euen thus is the other nyne squared sygure measured, and all suche lyke.





A rule for rounde Lande, and the partes therof.

THE V. CHAPTER.

Archimedes in libello circuli mẽsuratiõnis.

HAlfe the Diametre multiplied in halfe the Circumferẽce sheweth the content of any Circle.

Or thus more playnelye. Ye shall enter your Table with halfe the number of Pearches of the whole Circumference or compasse, and with the number of halfe the Diametre or breadth. So haue ye the content.

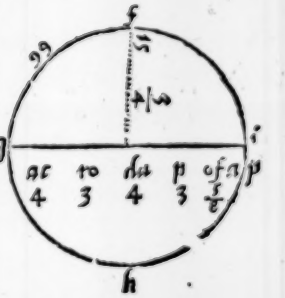
Ensample.

SUppose a piece of land, wherof the cõpasse is 100. pearche, the breadth 33 Pearches. I woulde knowe howe muche lande is in this Figure. Enter your Table with halfe the compasse, that is 50. and with halfe the breadthe that is 16. pearches. Because in the table I can not find 50. for the greatest Lengthe is 40 (therfore I enter with 40) and 16. So is founde foure Acres. Then I enter agayne with 16. pearches remaynyng and 16. the breadth as before: that bryngeth one Acre. Nowe to conclude, by addition of 1. and 4 I find 5. Acres in that rounde lande, whose halfe compasse is 50. pearches, and the breadthe 16. pearches.

FOr perfecte knowledge and vse of this Table folowing, when partes of pearches are adioyned, note well this other ensample ẏ ensueth, b. ẏ also what is sayde of the declaration annexed vnto the Table, when partes of pearches are in the length, breadth, or in bothe.

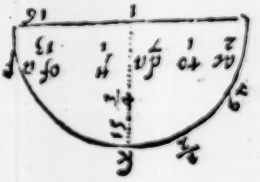
How partes of pearches are to be cõpted in measuryng.

Imagine e. g. h. to be a round peece of lande: I fynd by measure the whole compasse 99. Pearche. The halfe is 49. ½. The hangynge Lyne or halfe breadth is 15 ¾. Enter your table wt the whole Pearches, that is 49 and 15 leauing out. ½. and ¾ whiche were but



but parts of pearches So haue ye. 4. acres. 2 rodes 3. dayworkes. & 3. Pearches. For those parts of pearches omitted at your firste entringe the table worke thus. The halfe pearche, quarter, or other partes of a pearch in the length, must be reckned by them selues in the whole breadthe: and those of the breadthe contrarywise in the lenth. If there be suche odde partes in bothe, then reken them of the length in the whole breadth, & then of the breadth in the whole length: ioyning to the other afore gotten, remembring the product of the one fraction multiplied in thother, to be pulled from the encrease. To make this matter playne, I will take this last ensample before. The one number wherwith I should haue entred my Table, was. 49. ½. the other. 15. ¾. I founde first by entring with. 49. & 15, omitting the odde parts) 4. Acres. 2. roodes. 3. Day works, and. 3. pearches. Nowe for the encrease of the partes of pearches left out, I must (as I sayd) reken them of the length in the breadth, and contrarywise them of the breadth in the length. Halfe, 15. 3. is 7. pearches and. ⅞. Three quarters of. 49. ½. is. 37. Pearches. ½. Whiche added, makes 45 pearches: This adioyned to the number afore gotte, bringeth the whole content of rounde figure, which is. 4. Acres. 3. Roodes. 4. day worke. 3. Pearches and. ⅛. of a pearche, the product of the one fraction multiplied in thother subducted. What must be done whē that numbers wherwith ye should enter excede your table, counsell the declaration of your table there adioyned.

Of the halfe Circle.



To measure half circled Lande.

For this halfe Circle. enter the table with halfe his compasse, and wyth half the Diametre of the circle, or with the length of the pricke hangyng lyne, k. l. So the content of this halfe circle, is. 2. Acres. 1. roode 7. daye woorkes. 1. Pearche, and ⅛ of a Pearche.

An other ensample of portions and partes of a Circle,

Suppose n m o folowyng wer a part of a Circle, or pece of lād, whose content ye desired. The whole compasse of the Circle which this portion representeth, is (as afore) 99. Pearches: his Diametre or breadth 31. ½. The pricked arche or compasse n m o. is 74. Now with the halfe breadth or semidiametre of the circle. 15. & with 37 the halfe of the pricked compasse enter your table. So haue ye 3. Acres 2. Roodes 5. Daye woorkes 2. Pearches, and ½. of a

Pearche, the contente of the piece of Lande full of Pyckes, to the sydes of the Triangle pricked.

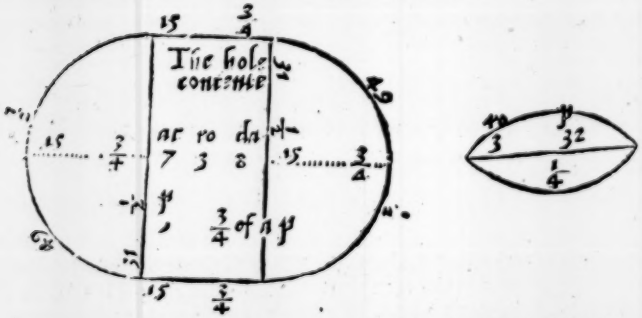
To measure partes of circled lande.

If ye desyre to knowe the summe of pearches in thother portiõ beneth the Triãgle, seperated by the lyne. m. o. ye must adde the contente of the triangle (which is. 3. Roodes, and $\frac{1}{2}$ of a pearch found by the rule of Triangles) to the Acres & pearches before searched. So have ye 4. acres. 1. roode. 5 Paywoorks 3 pearches, & $\frac{1}{2}$ of a pearche. This subtracted or pulled from the number conteyned in the whole Circle, the remayne is the pearches included in the smal pece beneath the Triangle. That is. 1. Roode. 36, pearche, and $\frac{1}{8}$ of a pearche.

Howe mixed fygures are measured.

Lande compounde of circles or his partes.

I Thinke none now wil doubt how these two figures folowinge are measured, because they are made of porcions or partes of Circles, whose measure is before sufficientlye opened: the one consysting of two halfe circles and a Quadrangle: the other beyng the porcion of the Circle. m. o. doubled.



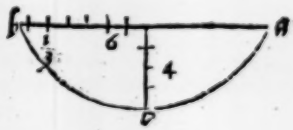
If any cuill fashioned lande chaunce to be measured, whyche requireth to be brought in many triangles, to saue labour, ye maye adde some portion vnto that, and make it square or otherwyse. So let it then be measured: and after from the product pul awaye that ye added: the remayne is the content.

To finde the content ſuperficiall, of Steples, Columnes, Globes, and their partes

TO the Arithmetrician I ſay: For pyched Steples, multiplye the whole ſyde in halfe the Circumference of the baſe adding the playne of that baſe. For Pillers augmente the Circumference of the baſe in the height, puttyng to the playne of both Baſes. For Globes, the Diametre in the Circumference multiplied: euen ſo of Fragmentes or Partes. Let them that be vnſyde of Arithmetike, enter my Table of accompte folowyng, with ſuch nũbers as I now wylled the Arithmetrician to multiply, not forgettyng what I haue before written So I ſerue their turne. To meaſure Steples, Colũnes, Globes, &c.

Or thus by the rule or propotion, the partes of a Globe are founde.

Suppoſe. a. b c. to be a piece of a Globe, and. 4. to be a portion of the diametre, ỹ whole being 14. Thus I ſay 14. The whole Diametre geneth. 616. the contente ſuperficiall of this Circle: what ſhall 4. bryng: So haue ye. 176. which is the content of that pece.



To meaſure partes of Globes.

To finde the diametre by ſome knowen portion therof.

IF ye be ignorant what lengthe the Diametre of that Globe is whoſe portion ye haue: the height or parte of the Dimetient being 4. foote augment halfe the lyne a b which is $6\frac{1}{2}$ in hym ſelf and the producte diuide by 4. So haue ye 10. to be added to 4. which maketh 14. the whole Diametre. To fynde the vnknowen Diametre of a Globe.

The true meaſuring of Mountaynes and valleys.

THE VI. CHAPTER.

FIrſt ye ſhal meaſure the circuite of the fote, or baſe of the Mountaine: then the compaſſe of the ſummitie or toppe, adding them together. So ſhall ye do of the Aſcenſes, that is, the goinge vp from the foote to the toppe: ioynyng the meaſure of the longer and ſhorter in one. Nowe take the halfe of the circuites added, and the halfe parte of the Aſcences ioyned, and enter youre Table. There ſhall ye ſe the content. To meaſure Mountaynes

Figure of a Moũtayne.

A B. C. is the Mountaine. a. c. the circuite of the base, being. 100. Pearches: b. the toppe. 16. Pearches. Whiche ioyned together make. 116. B. c. the one ascense, is. 55. Pearches: the other. 75. These added make. 130. The halfe of the circuites, is. 58. the halfe of the Ascẽses. 65. With these two summes ye shall enter your table of accõpte: where ye shall synde. 23. Acres 2. rodes, and. 10. pearches, the true content of this figured hill.

Of the Valley.

To measure Valleies.

AS in the Mountayne ye measured the circuite or cõpasse of the base or foote: so here contrarye, ye shall meete rounde aboute the circuite, or compasse of the height of the Valley And as ye gotte the measure or compasse of the toppe of the Mountaine: so measure the circuite of the depthe of the Valley. In lyke maner as ye measured the ascense. that is, the going vp from the foote to the toppe: so measure the descense, or goyng downe of the Hyll to the depth of the Valley. The rest all worke, as I haue shewed in measuryng the Mountayne.

Figure of a Valley.

For more plainnesse, beholde this ensample, or figure. If ye laye together the circuites of the heyght and depth, whiche is. 210. and. 30. takyng the halfe parte of those two circuites, makynge an. 120. then the two ascenses. 150. and. 60. added in one product. 200. the half therof beyng. 100. with thys, and. 120. the other halfe of the circuite, ye maye enter youre table. That doynge, loe. 75. Acres.

Howe

Howe the table of accompte now followinge is to be vſed.

WHen you haue gotten a conuenient length and breadth, (as I haue aboue declared, by diuers triangles & other figures) then you ſhall enter this table. Seke there the length & moſt number of Perches in the higher margyne, which beginneth at 1. and endeth rightwarde at 40. Loke thother ſumme of Perches (I meane the breadth) in the right ſide, and hanging margine, from 1. deſcending to 30. Now at the meting of the lines, where the one anſwereth the other direcly in a ſquare, you ſhal finde the Acres, Rodes, Dayworkes & Perches. Note that the firſt number ſet on the lefte ſide & vpper parte in anye ſquare, ſignifyeth the number of Acres. The fygure 1. ſet in the vpper part and right ſide, both betoken a Rode: the fygure 2. there two Rodes. 3 three Rodes. Anye fygure in the left ſyde beneth, ſignifyeth a Dayewoorke, or Dayewoorkes. A fygure in the lower parte rightewarde, declareth Perches.

A Declaration adioyned

WHen it chaunceth that the one number or booth with the which yee ſhould enter this table, are greater then anye here founde: it behoueth you to take the halfe of thone, & the whole of the other, or what partes yee liſte of boothe moſt commodious for your purpoſe, and ſo enter your table. Loke then what is there founde, and it ſhall beare his name of the partes multiplyed in them ſelues.

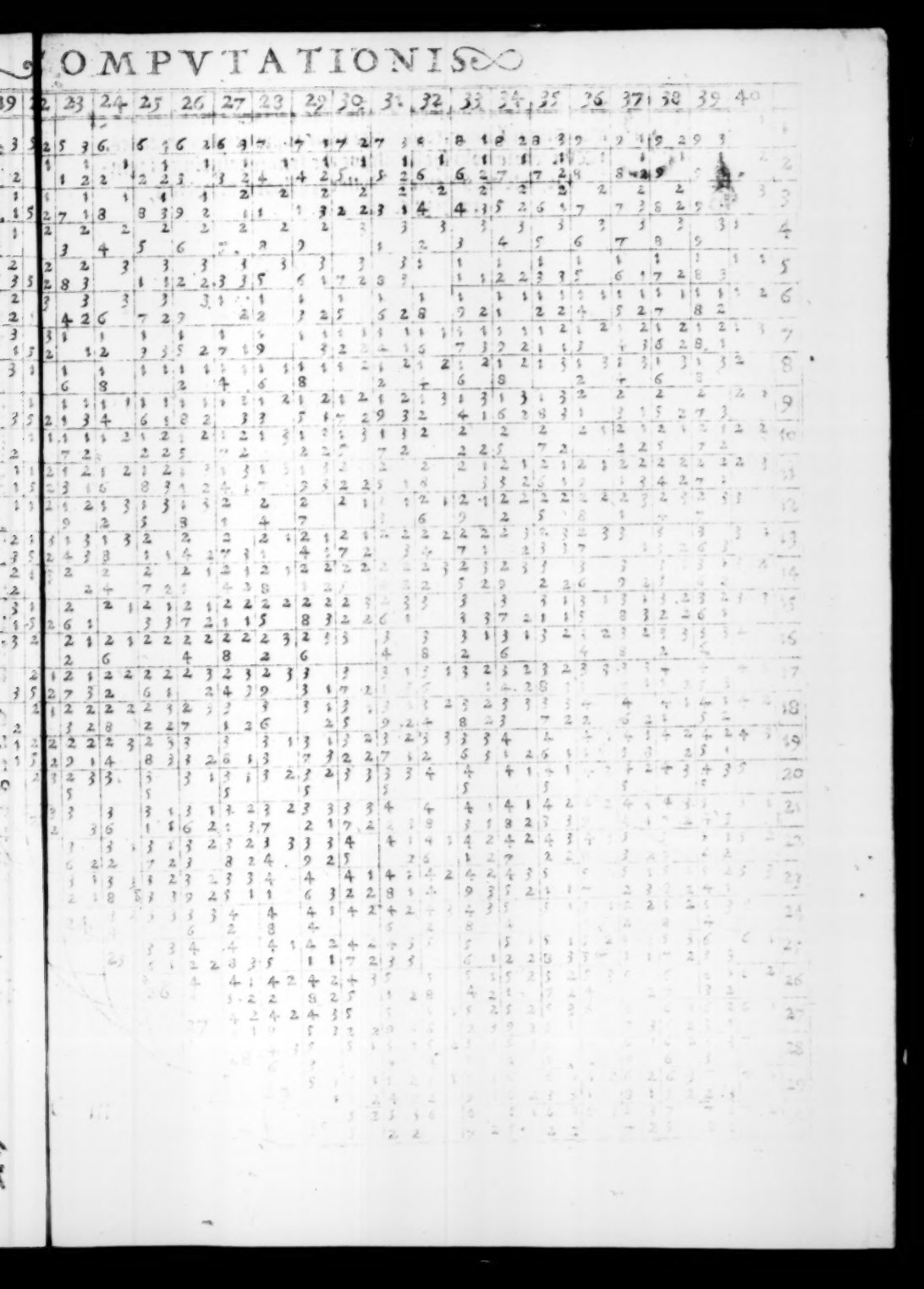
VVhat is to be done whē numbers (with which you ſhoulde enter) excede youre Table.

Enſample. Suppoſe the number with the which yee ſhould enter your table to be .103. Pearches in lengthe, and the breadth neyther of theſe maye be founde in the margynes: wherefore I take the thirde parte of an 103, which is 34. Pearches and one remayneth. The halfe of 60. that is 30. I kynde with entringe them at the commune metinge 6. Acres 1. Rode, & 5. Daywoorkes. This ſumme muſt haue his name of the partes augmented in them ſelues. I toke the thirde part of the one, and halfe the other number. therefore 2. muſte be multiplyed in 3 or contrary, ſo haue ye 6. which ſignifyeth that yee haue found by entring, but the firſt part of that number ye ſhuld finde Wherfore I muſt make this ſumme tofore found (being 6. Acres 1. Rode, and 5 Daywoorkes) firetimes as much. So haue ye 38. Acres & one Rode For the Pearche remayning in the lengthe, reckon him in the breadth, (as is afore declared) in the 5. Chap of the remaynes: ſo haue ye 60. Perches more to be added. So the encreaſe of theſe two numbres. 103. and 60 amounte to 38 Acres, 2. Rodes, and 5 Daywoorkes. Thus anye maner length and breadth, is reduced to this Table followinge, which ſufficeth.

Loke what I haue ſhewed in the 5. Chapter of partes, that vnderſtand here of hole perches leſt: ſubtracting &c.

TABVLA

OMPVTATIONIS



THus with fewe wordes is ended the certayne measuringe of all manner Lande, touchinge their superficiall contentes. Wherefore now shall followe the true measuring of tymber, Stone, Steples. Pyllers, Globes, according to theyr Crassitude.

To the Reader.

IT commeth commonlye to paſſe, that Carpenters, Maſons, and ſuche like Artificers are put eyther to meaſure Timber euery way ſquare, or ſquared loges, broader on thone, then on thother ſide, yea many tymes mutilate or vnperfecte ſtuffe: ſome tymes 3. 5. 10. or 20. ſquare in the head, & ſo throughe, oftentymes rounde ſtone or tymber, with hollowed. &c. Afore I ſhew vnto them what muſt be done with ſuche peces of Tymber or ſtone to gette their true meaſure, my deſyre ſhall be, that ſuche Craftesmen will leaue to be heady or ſelfwylled, yea ſo greadily to sticke to theyr olde corrupted rules that vtterly they refuſe to be taught.

Both learnyng & experience declareth vnto me, that the grounds which the beſt of them haue, are falſe. To open howe and where, it nedeth not: neyther doth it appertayne to inſtruction. Only it may ſuffice him that liketh the true way, here to receiu' it appointed to him yet to ſatisfye and content him which will not beleue any ſuch errours or falſe groundes to be: I ſay (and truely) that the Ruler of tymber meaſure, which the more part of them hath, is not made by right arte. Beſides that, their craft in ſeekyng the ſquare of ſome tymber is very falſe. They vſe in meaſuryng to lay the broader and narrower ſydes together in a ſumme: and to take the halfe of that number for the ſquare. Then they ſette this vntrue ſquare vpon the falſe ruler: and ſo meaſuring the tymber, they conclude of it vntruly. As this is corrupted, ſo are other groundes whiche they take to be infallible. Now to the purpoſe, touching ꝯ correction of thoſe errours with other not mentioned, wherby true meaſuring may enſue, this way ſhalbe taken. After I haue opened howe ye muſt handle al ſuch faſhioned tymber (as afore is ſpoken of) there ſhal folow a table, in which ye may fynde (as I will declare) the ſquare of anye ſtone, or tymber. That knowen, it is requiſite to haue an other table immediatly folowyng, which maye appoint to all true ſquares, from, 1. to 6. ynches, the iuſt length to make a Foote euery waye ſquare. With the length agreable to your ſquare, your logge muſte be meaſured. And as oft as ye fynde it from the one end to thother of your tymber, ſo oft ye may conclude the foote ſquare to be conteyned

In a foote ſquare is cõteined 1728. Inches.

ned in that timber logge, or stone: that is, so many square fete there to be included. This table of tymber measure standeth in the place of a good Ruler, well decked with true measures. By thys ye may make or correct rulers at pleasure, as after appeareth.

Now orderly folowyth the true measuryng of all fashioned Tymber or Stone afore named.

How tymber or stone, foure square euery way, or broader on the one then on other syde, is measured.

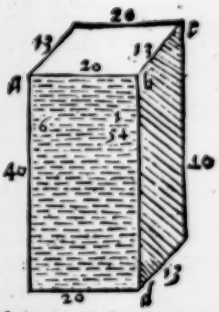
THE VII. CHAPTER.

IF a pece of Tymber, or Stone be eyther equally square, or broader by the one side then on the other, ye shal take the iust measure. I meane how many Inches the broade syd conteineth: euen so of the narrower. This done ye must seke in ỳ table of squares folowinge the measure of the broader syde of the timber or stone, in ỳ vpper margine of that table. Then loke for the number of Inches of the equall or narrower syde, in the right parte and hanging margine. At the commune metinge, where the one number answereth directlye to the other, there your true square shal appeare. Thys square so found shall be referred to your table of tymber measure: in the which ye may playnely see (yf you runne downe by the left margine, vntill your Inches square appeare) how many fete or Inches of your ruler belongeth to a foote square. As often as that measure there found is conteyned in the tymber or stone, so often and as many fete square ye may conclude (without doubt) that pece of timber or stone to haue.

Ensample.

SVppose this squared Tymber or Stone. a. b. c. d. were to be measured, ỳ broader syde. a. b. 20. Inches, the narrower syde. b. c. 13. ynches, the length 20. ynches. Nowe I muste seke the broader syde. 20. in the vpper margine

of the



of the table. The narrower ſyde. 13. muſt be found in the right ſyde and hanging margine. At they? cõmon meting 16. inches, and ½. part of an Inche ſhall appeare. Thys true ſquare muſt be ſearched for in the Table of timber meaſure. Therfore loke for. 16. in the margine of this Table. In the ſquars with him rightward, ye ſhal finde 6. Inches, and ½ which is thre quarters of an inche. Some dele leſſe of your ruler then. 6. and. ½. layed out vpon the Timber, maketh a fote ſquare And that meaſure ſo diſcretely handeled, is conteyned in the lengthe of your tymber fyre tymes. Wherfore affirme fyre fote there to be, beſide that is left. ¼. parte of a fote. Note becauſe ỹ ſquares, at al tymes (as in this enſample) ryſe not to euen Inches, but ſometime to odde partes: Therfore accordyng to your diſcretion, adde or take away ſom part more or leſſe in ſettyng forth the fote ſquare, as aboue is performed.

It were intollerable tediouſnes, yea impoſſible, to ſet forth ỹ true quantities of tymber meaſure, to al odde quatities of quares. The diſcrete handlyng of theſe, the wittie ſhall bringe to a ſufficiente exactneſſe.

Of Tymber or Stone, 3. 5. 10. 20. or more ſydes ſquare, &c.

THE VIII. CHAPTER.

When Tymber haue diuerſe equall ſquares in the head, and ſo throughout: firſt meaſure al the ſquare ſydes round about the heade or ende of the tymber Then take half the number of that whole meaſure for thone Breadth. Then meaſure from the Cẽtre (which is the middle of the head, or ende of the Tymber) to the middes of one ſquare ſyde, betwene the two angles, and take the meaſure of that diſtaunce for the other breadthe. Nowe reſorte with the meaſures of theſe two breadthes (as tofore) to the Table of ſquares: ſeking the bigger nũber or breadth in the vpper margine, and the other leſſe in the ſyde

margine

margine. With the square there founde, haue recourse to the table of tymber measure (and do as I haue instructed.

Ensample.

Admit this smal pece of timber f. square e. f g h should be measured, euery syde being 12 Inches. If ye adde together in one sume all the 5. sydes, they make 60. Inches. The halfe is 30. that serueth for one Breadth. Then the line e f which goeth frō the Centre or middes of the square to the myddle of one syde, is 8 Inches. The two numbers 30 and 8 muste be sought (as afore) in the table of squares folowing. At the commune metyng, your square shall appeare 15 Inches and ½. This square is sette in the table of tymber measure. There ye maye see ryght with it 7 Inches, and ½ Howe because of ½. the odde quantitie of the square aboue 15 Inches, lay somtime lesse. Then see howe oftentymes that measure (so with discretion handled) is from the one ende of youre tymber to the other: and affirme so many tymes a foote square there to be, as that measure is found in the lengthe of your logge.

Howe rounde and hollowed Tymber, Steples, Pillers,
Globes, &c. are to be measured.

THE. IX. CHAPTER.

First gyde the logge rounde aboute with some line: then deuyde the lyne, which compassed that tymber, in two equal partes, kepe the one part for the bygger Breadthe: After ye shall deuide agayne that whole length (the twenty and two part cast awaye) in three partes, and take the half of one of them for the other narrower Breadthe. With the measures of these two breadthes, passe to your table, persomyng al things as afore is opened.

Enter

Enſample.

Suppoſe this littel place of Tymber. i. k. l. m. were to be meaſured, the compaſe or gyrdinge. 36. pnches, the halfe of that is, 18. beynge the one Breadth: then the third part of 36. is. 12. the halfe of it is 6. whiche is the other narrower breadth. With theſe two nũbers. 6. and. 18. enter the Table of ſquares folowyng, & ſo the Table of Tymber meaſure. At the laſt (all thinges perfourmed as before) ye ſhal fynde in this round logge, (the length. l. m beyng. 18. pnches) 1. foote and. ½. part of a foote. This is ſufficient for all ſuche lyke.

A note of hollowed Timber.

If it chaunce that hollowed Tymber be to be meaſured: meaſure the whole logge as though it were not hollow, as aboue is declared. Then meaſure the narrower and broader ſyde of the hollowe: and ſee what is conteyned in that, as though it were maſſy Tymber. Nowe pulle out the contente of it. from the whole aboue meaſured: the remayne of force muſte ſhewe whyt tymber is included in that hollowed body.

I Am vnable in few wordes to expreſſe to the vnlearned, by what meane Pyramidal, or picked regular Steples of all faſhions are meaſured. Alſo how Pillers: how the contẽt of Globes or Bowles are ſearched: vnleſſe the arte of numbryng were taſted. That beyng knowen. thus (as nowe folowth) I teache.

Howe the Craſſitude of piked Steples is knowen.

Multiply the playn of the Baſe in the third part of the height: ſo ye haue the Craſſitude Or multiply the content ſuperficiall (founde as I haue inſtructed) in the height of the Steple,

takyng for your purpoſe the thyrd parte of that product.

Howe the content of Pillers is knowen.

Increaſe the baſe playne in his altitude or heighte: ſo haue ye youre deſyre.

How the Cubicall bodies of Globes are ſearched.

The content ſuperficial foũde (as I haue opened) muſt be multiplied in the fyrſte parte of the Diametre: the product is that ye require. Or the thirde parte of the Superficiall content is halfe the Diametre. Or multiplye the plaine of the Circle in the whole Diametre: then take two thirde partes, which added make the craſſitude.

Of the halfe Circle.

His ſuperficiall content multiplied (as is ſayde) bringeth the magnitude of him. If any man require enſamples of theſe laſte matters, or more ſufficient handlynge: let them reſorte vnto my boke publiſhed of Geometrye, there they ſhal be ſatisfied. Theſe little apperteyne to Carpenters or Maſons, therfore not be enſample declared.

A generall Note.

When thou ſhalt be put to meaſure ſome body without order or faſhion, lackyng parte of hys ſquare or hauing more then his forme: if it lacke thou ſhalt make it perfect by obſeruyng diligently the runnyng together of the ſydes. The partes wantynge ſhall be meaſured as though they were there, whiche portions muſte be taken from the whole body meaſured.

Alſo when there reſulteth any more then the forme or regular ſquare: fyrſt meaſure the ſquare body, then the craſſitude whych abounde th. All put together, do ſhewe the whole irregular body. This ſuffyſeth.

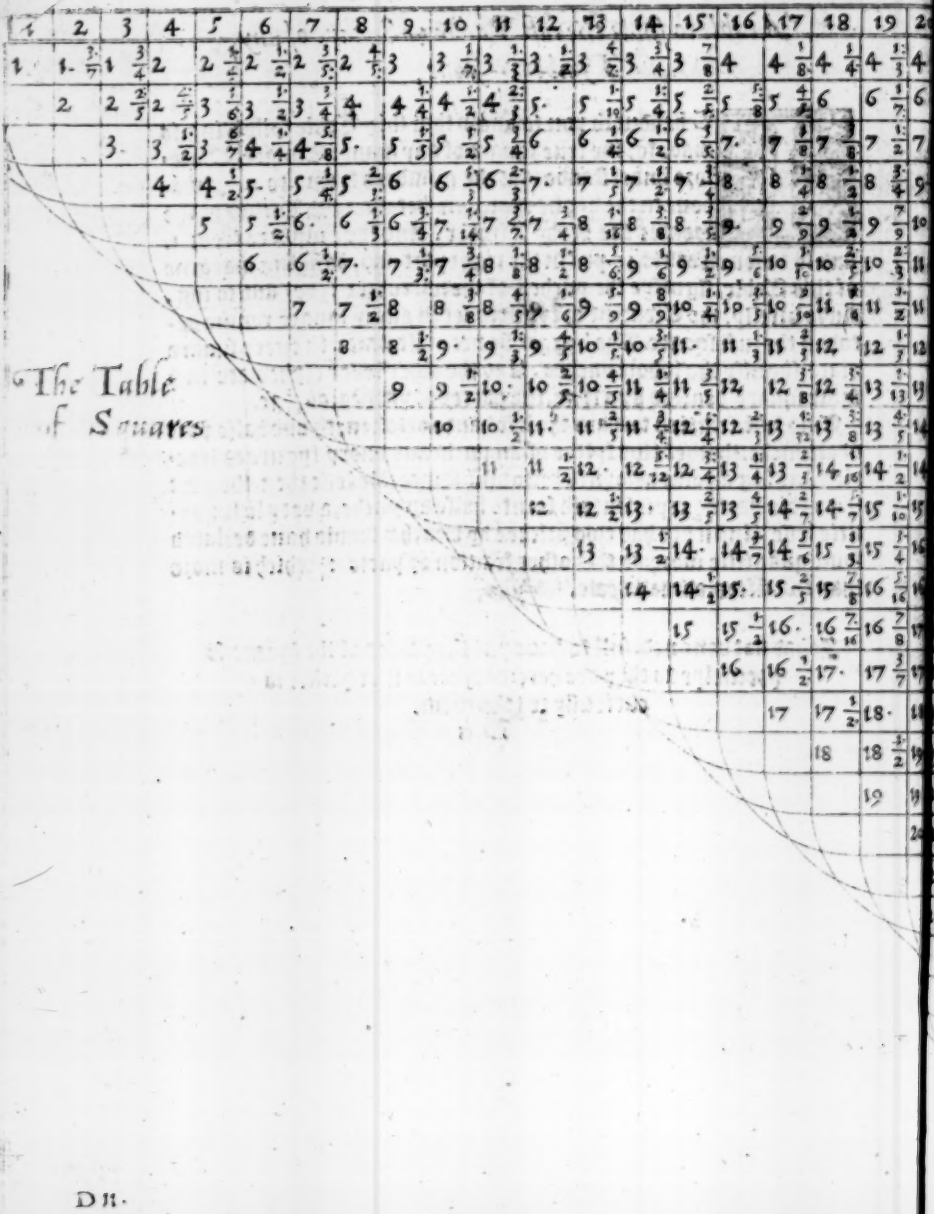
A tab

A table to finde the iuſt Radix or Square of any Tymber, or ſtone.

IT behoueth you to know that this Table following is made for the true ſquare of any maner Timber. Therefore vnderſtande that the numbers from 1. to 40. ſet aboue in the hyghe Margyne betoken the Inches of the broader ſide of the Timber. And the numbers from 1. and ſo downeward to 30. put in the right part and hanging margine of this Table, ſignifye the ynches of the narrower ſyde: and to conclude briefly, the Element or fygures ſet in euery ſquare roume betoken the iuſt ſquare. The bygger figures leftwarde in euery ſquare place, ſygnify the whole ynches. And the other leſſer rightward in ỹ ſame ſquare deuided by a lyne, the partes of ynches, as $\frac{12}{24}$ &c.

This firſt fraction toward the left hande betokeneth one halfe part of an ynche: thother two fyftes of an ynch: and euery fygure or fraction hauing a point adioyned vnto him ſomedeale leſſe then the part is: as this parte $\frac{1}{2}$ repreſenteth ſcante halfe an ynche, a very litle quátitie leſſe. And if hee had two prickes by him, hee ſhould haue declared ſome quantitie more: as this other fraction or parte $\frac{2}{5}$ which is more than two fiftes, a ſmall deale.

It had not bene nedefull to haue put the partes of the ſquare ſo preciſelye as they are here: neyther is it requiſite ſo curiouſly to take them.



The Table of Squares

22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	
4 6/9	4 3/4	5.	5.	5 1/10	5 3/16	5 1/3	5 2/3	5 1/2	5 1/2	5 5/8	5 3/4	5 2/10	5 7/8	6	6 1/16	6 1/8	6 1/4	6 1/3	1
4 1/7	6 2/3	6 5/6	7.	7 1/16	7 3/14	7 3/8	7 1/2	7 3/5	7 3/4	7 7/8	8	8 1/8	8 2/9	8 3/8	8 1/2	8 5/9	8 3/4	8 7/8	9.	2
4 1/2	7 1/8	8 5/16	8 1/2	8 2/3	8 7/8	9	9 1/6	9 1/3	9 1/2	9 2/3	9	10.	10 2/10	10 1/4	10 2/5	10 1/2	10 5/7	10 4/5	11.	3
4 3/4	9 1/5	9 2/3	9 5/7	10	10 1/4	10 2/5	10 1/2	10 4/5	11.	11 1/8	11 1/2	11 1/3	11 4/5	12	12 1/6	12 1/3	12 1/2	12 2/3	4
4 7/9	10	10 1/2	10 3/4	11.	11 1/6	11 1/3	11 1/2	11 5/6	12	12 1/4	12 1/2	12 2/3	12 4/5	13	13 1/6	13 1/3	13 1/2	13 4/5	14.	14 1/7	5
4 2/3	11	11 1/2	11 2/3	12	12 1/4	12 1/2	12 3/4	13.	13 1/5	13 2/5	13 1/2	13 2/3	13 3/4	14	14 1/7	14 1/2	14 5/7	15.	15 1/10	15 1/3	15 1/2	6
4 3/4	12	12 1/3	12 2/3	13.	13 1/4	13 1/3	13 1/2	13 3/4	14	14 1/4	14 1/2	14 3/4	15.	15 1/5	15 2/5	15 1/2	15 6/7	16	16 1/4	16 1/3	16 1/2	16 3/4	7
4 5/7	13	13 1/4	13 1/3	13 5/6	14 1/7	14 2/7	14 2/3	15.	15 1/4	15 1/2	15 3/4	16	16 1/2	16 1/2	16 2/3	17.	17 1/7	17 2/7	17 1/3	17 1/2	17 6/7	8
4 6/7	13	14 3/16	14 1/3	14 3/7	15	15 1/4	15 1/3	15 3/4	16 1/7	16 1/3	16 1/2	16 3/4	17.	17 1/4	17 1/2	17 3/4	18	18 1/4	18 1/2	18 3/4	19	9
4 4/5	14	14 6/7	15 1/6	15 1/2	15 4/5	16 1/8	16 2/5	16 3/4	17 1/17	17 1/2	17 2/5	17 7/8	18 1/6	18 1/2	18 2/3	19.	19 1/4	19 1/2	19 3/4	20	10
4 4/5	15	15 1/2	15 2/3	16 1/2	16 1/4	16 3/8	17 1/4	17 1/2	17 5/7	18	18 1/2	18 2/3	19 1/16	19 1/3	19 5/8	19 7/9	20	20 1/6	20 3/7	20 3/4	21.	11
4 1/10	16 1/4	16 5/8	17.	17 1/3	17 2/3	18	18 1/3	18 2/3	19.	19 1/4	19 2/3	19 8/9	20 1/5	20 1/2	20 4/7	21.	21 1/3	21 2/3	21 8/9	22	12
4 1/4	17	17 1/4	17 2/3	18 1/32	18 1/8	18 3/4	19 1/16	19 3/7	19 3/4	20 1/16	20 2/5	20 3/4	21 1/32	21 1/3	21 3/8	22.	22 1/5	22 1/2	22 3/4	23	13
4 5/16	17 2/16	18.	18 1/3	18 1/4	19 1/14	19 3/7	19 5/6	20 1/7	20 1/2	20 7/8	21 1/7	21 1/2	21 4/5	22	22 2/9	22 1/4	23 1/10	23 2/8	23 3/8	24	14
4 7/8	17 1/6	18 3/14	19.	19 3/8	19 3/4	20 1/8	20 2/4	20 7/8	21 1/5	21 5/9	21 2/10	22 1/4	22 3/8	22 3/8	23 1/5	23 1/2	23 3/8	24 1/5	24 1/2	24 2/3	15
4 2/7	17 2/9	19 1/7	19 5/8	20	20 2/5	20 4/5	21 1/6	21 1/2	21 7/8	22 1/4	22 3/5	23.	23 1/3	23 3/8	24	24 1/9	24 1/2	25.	25 1/4	25 1/2	16
4 1/3	19	19 3/4	20	20 1/6	20 3/8	21 1/4	21 1/3	21 1/8	22	22 1/3	22 1/2	23 1/8	23 1/3	23 3/4	24	24 1/3	24 1/2	25	25 1/3	25 1/2	26	17
4 1/2	19 2/8	20	20 1/4	21 1/5	21 3/8	21 11/32	22 1/2	22 1/2	22 3/4	23 1/4	23 1/8	24	24 1/3	24 1/4	25	25 1/10	25 1/2	25 3/4	26	26 1/2	26 3/4	18
4 1/2	20	20 1/10	21	21 1/3	21 3/4	22	22 1/4	23 1/16	23 1/2	23 7/8	24 1/4	24 2/3	25 1/32	25	25 1/3	25 1/4	26	26 1/2	26 1/2	27	27 1/2	19
4	21	21 3/7	21 8/9	22 1/8	22 4/5	23	23 1/4	23 2/3	24 1/16	24 1/2	24 1/2	25	25 2/3	26	26 1/13	26 1/2	26 4/5	27	27 1/8	27 1/2	27	20
4 1/2	22	22 1/2	22 2/8	23 1/3	23 4/5	24 1/4	24 2/3	25 1/10	25 1/2	25 8/9	26 1/3	26 3/4	27 1/9	27 1/4	27 1/8	28	28 1/2	28 7/8	29	29 1/3	21
4 2	22 1/2	23	23 1/2	23 7/8	24 3/8	24 5/6	25 1/4	25 3/4	26 1/8	26 1/2	27.	27 1/3	27 3/4	28	28 1/2	28 7/8	29 1/4	29 5/6	30	30 1/3	22
	23	23 1/2	24.	24 1/2	24 7/8	25 1/3	25 7/8	26 1/4	26 3/4	27 1/8	27 1/2	28.	28 1/8	28 3/4	29	29 1/6	29 5/6	30.	30 1/3	23
		24	24 1/2	25.	25 1/2	25 7/8	26 3/8	26 4/5	27	27 1/4	27 3/4	28 1/7	28 1/2	29.	29 1/8	29 4/5	30	30 1/5	30 1/3	31	24
			25	25 1/2	26.	26 1/2	26 7/8	27 3/8	27 4/5	28 1/4	28 3/4	29 1/6	29 1/5	30	30 1/3	30 1/5	31	31 1/8	31 1/4	32	25
				26	26 1/2	27.	27 1/2	27 4/5	28 3/8	28 3/4	29 1/3	29 3/4	30 1/7	30 1/2	31.	31	31 2/5	31	32	32 1/4	26
					27	27 1/2	28	28 1/2	28 7/8	29 2/5	29 4/5	30	30 1/4	30 3/4	31	31 1/6	31 1/5	32	32 1/32	32	32	27
						28	28 1/2	29.	29 1/2	29 7/8	30 1/3	30	30 7/8	31	31 1/4	31 3/4	32	32 1/16	32	33	33	28
							29	29 1/2	30.	30 1/2	30 7/8	31	31 3/8	31 7/8	32	32 1/2	32	33	33 1/8	34 1/16	29
								30	30 1/2	31	31 1/2	32.	32	32 3/8	32 7/8	33	33 1/2	33	34	34	34 5/8	30

The table of Tymber measure with the declaration and vse of it.

The. x Chapter.

This Table (as ye see) is deuided into two columes or rowes: the one very shorte, the other longer. In the head of the first, I haue put this worde foote in the second rowe Inches and partes: to signify feete, inches, and partes of inches. The summes in the margyne and left parte of the first and seconde colume, declare the quantity of the square of tymber or stone, from 1. to 36. inches square. Within the rowes you maye finde the iuste lengthe to a foote square, if ye enter into them in righte order, according to the square.

Ensample.

Suppose the square of your tymber were 7. ynches, and that ye desyred to know what measure or length of the ruler would make a foote square. Seeke in the left margyne 7. ynches: and with him in that order toward the right hande, yee shall find 2. foote. 11. ynches, & 2/7 of an ynche. Note because the fraction 2/7. hath a pricke by him, it betokeneth some small quantity lesse then 1/7 of an ynche. If it had two prickes or pointes thus: 2/7 it shoulde signify some lytle quantity more. Neyther maketh it matter, whether ye obserue this prickyng or no, the quantity is so lytle to be added or pulled away.

Note what hath beene spoken of Tymber, the same also is to be vnderstande of stone, lyke wyse to be measured.

¶ Thus is finished the measuring of tymber. now ensueth of Boorde. &c.

How

Table, Borde, or Glasse.

How Tables, Bordes, Glasse, or any suche like are measured, according to their length and breadth onely to the foote square.

THE XI. CHAPTER.

This thing is perfo3med by the helpe of a large table folowyng, diuided in fyue small tables, & as many margines. The firste and lefte margine beginneth at. ¼. which is one quarter of an ynche, and extendeth to. 6. ynches, as ye maye playnelye perceiue if ye runne downe by that margine. This hath this Table on the ryght syde adionyng vnto hym. The other taketh hys begynninge at. 6. ynches. ¼. and endeth at 12. hauing hys p3oper table also. The thirde from. 12. ¼. to 18. And so from. 18. ¼. to. 24. From. 24. ¼. to 30. The last margine is from 30. ¼. to 36. and there endeth.

Of this that is sayd, you may gather that euery margine hath his Table on his ryght syde. Also you must know that in the top and beneth I haue put (as in the table of Tymber measure) these wo3ds fote, ynche, and partes, to signifie fete, ynches, & partes of an ynch. Whensoeuer ye lyste to measure, Bo3de, Glasse, o3 any other suche, with the b3eadth of it enter thys table, and seke that b3eadth in his p3oper margine. There ye shall find in ryght o3der how many fete, yncher, o3 partes of an ynche, belong to a foote square. So often as the measure is in your stuffe, iust as many fete haue ye in that bo3de o3 suche lyke. If the b3eadth excede this Table, thē diuide ỹ b3eadth in partes, and wo3ke as is and shall be declared. So the ingenious applieth this table fo3 all maner b3eadthes most exactly.

Ensample.

Suppose I haue a pane of Glasse, o3 a bo3de, whose b3eadth wer 22. ynches. ¼. the length 16. fote. In the fourth margin I synde this b3eadth 22 ¼. And euen with in the table right ward I se 6. ynches. ¼. So much of my ruler wanting some small quātitie, maketh a foote. Now, because in the length of my bo3de (which is 16. foote) that measure is found. 29. tymes, and ⅔ partes, I concluded. 29 fote ther to be, & two third partes of a fote square, acco3dynge to

Fo Yn			Fo Yn			Yn Par		Yn Par		Yn Par		Yn Par		
1/4	48		6 1/4	1	11 1/21	12 1/4	11 3/4	13 1/4	7 7/8	24 1/4	5 15/16	30 1/4	4 3/4	
1/2	24		6 1/2	1	10 1/7	12 1/2	11 1/2	13 1/2	7 4/7	24 1/2	5 7/8	30 1/2	4 5/7	
3/4	16		6 3/4	1	9 1/3	12 3/4	11 2/7	13 3/4	7 2/7	24 3/4	5 4/5	30 3/4	4 2/3	
1	12		7	1	8 4/7	13	11 1/16	14	7 1/7	25	5 3/4	31	4 5/8	
1 1/4	9	7 1/5	7 1/4	1	7 7/8	13 1/4	10 7/8	14 1/4	7 1/2	25 1/4	5 2/3	31 1/4	4 5/8	
1 1/2	8		7 1/2	1	7 1/5	13 1/2	10 5/8	14 1/2	7 2/3	25 1/2	5 5/8	31 1/2	4 4/7	
1 3/4	6	10 2/7	7 3/4	1	6 4/7	13 3/4	10 1/2	14 3/4	7 2/7	25 3/4	5 5/8	31 3/4	4 1/2	
2	6		8	1	6	14	10 2/7	20	7 1/5	26	5 1/2	32	4 1/2	
2 1/4	5	4	8 1/4	1	5 3/7	14 1/4	10 3/7	20 1/4	7 1/8	26 1/4	5 1/2	32 1/4	4 1/2	
2 1/2	4	9 3/5	8 1/2	1	4 15/16	14 1/2	9 7/8	20 1/2	7 1/3	26 1/2	5 3/7	32 1/2	4 3/7	
2 3/4	4	4 3/8	8 3/4	1	4	14 3/4	9 3/4	20 3/4	6 15/16	26 3/4	5 3/8	32 3/4	4 3/8	
3	4		9	1	4	15	9 5/8	21	6 6/7	27	5 1/2	33	4 1/3	
3 1/4	3	8 1/3	9 1/4	1	3 4/7	15 1/4	9 3/7	21 1/4	6 4/5	27 1/4	5 2/7	33 1/4	4 1/3	
3 1/2	3	5 1/8	9 1/2	1	3 1/7	15 1/2	9 2/7	21 1/2	6 3/4	27 1/2	5 2/7	33 1/2	4 2/7	
3 3/4	3	2 2/5	9 3/4	1	2 3/4	15 3/4	9 1/8	21 3/4	6 5/8	27 3/4	5 1/5	33 3/4	4 1/4	
4	3		10	1	2 2/5	16	9	22	6 1/2	28	5 1/8	34	4 1/4	
4 1/4	2	9 7/8	10 1/4	1	2 1/21	16 1/4	8 6/7	22 1/4	6 1/2	28 1/4	5 3/32	34 1/4	4 3/16	
4 1/2	2	8	10 1/2	1	1 3/4	16 1/2	8 3/4	22 1/2	6 3/8	28 1/2	5 1/16	34 1/2	4 1/6	
4 3/4	2	6 1/3	10 3/4	1	1 3/8	16 3/4	8 5/8	22 3/4	6 1/2	28 3/4	5	34 3/4	4 1/8	
5	2	4 4/5	11	1	1 1/11	17	8 1/2	23	6 1/4	29	5	35	4 1/8	
5 1/4	2	3 3/7	11 1/4	1	4/5	17 1/4	8 1/3	23 1/4	6 1/5	29 1/4	4 7/8	35 1/4	4 3/32	
5 1/2	2	2 1/5	11 1/2	1	1/2	17 1/2	8 1/5	23 1/2	6 1/8	29 1/2	4 7/8	35 1/2	4 1/16	
5 3/4	2	1 2/3	11 3/4	1	2/7	17 3/4	8 3/32	23 3/4	6 1/16	29 3/4	4 5/6	35 3/4	4 1/32	
6	2		12	1		18	8	24	6	30	4 4/5	36	4	
Fo Yn			Fo Yn			Yn Par		Yn Par		Yn Par		Yn Par		

the length and breadth. I ſayde (wantynge ſome ſmall quantitie) becauſe of the poynt ioyned to this fraction ⅀, which is put to diminiſhe that fraction ſome litle thinge, as is declared playnely in the other tables before put forthe.

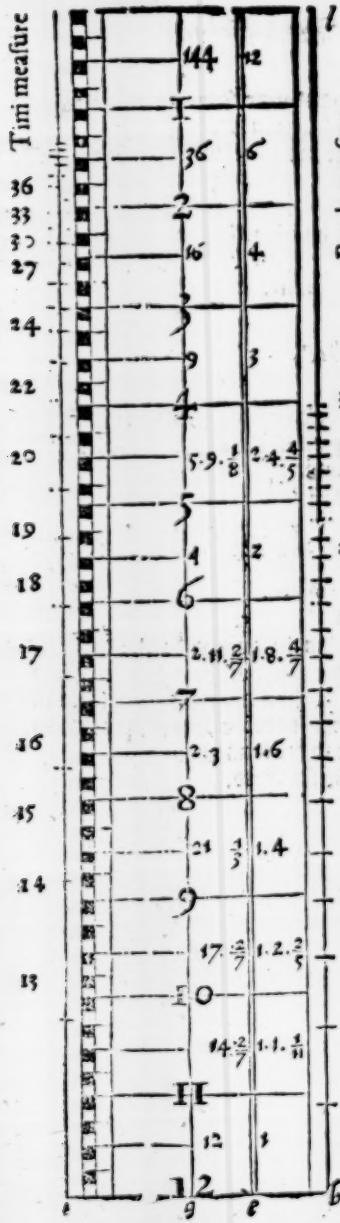
HE that deſireth to meaſure Chamberflooꝛes, Pauimentes, oꝛ ſuch lyke, let him only multiply the breadth with the lēgth ſo the product ſhewth the content.

Enſample.

IF there were a pauement. 100. foote longe, and in Breadthe 50. I muſt nedes conclude (by multiplication of the breadth there to be conteyned 5000 foote.

Or thus without Arithmetike whē the breadth exeadeth the Table.

DIuide the breadthe in partes (as in opened in the declaration of the Table of accompte) and woꝛke as I haue before inſtructed. So foꝛ Pauementes all maner wayes it ſerueth your turne. Of this matter to put foꝛthe tables, were ſuperfluous tediouſnes and follye. The ingenious with theſe fewe, will be ſatiſfyed.



The Carpeters Ruler

The face of the Carpenters ruler, figured with the true measures, and other thinges necessary.

THE XII. CHAPTER.

BEcause the effecte of this Ruler is aboue declared by tables, an Instrument also well knowen and commune amonge good Artificers: I will not spende many woordes, in openyng it. Beholde the fygures, and learne by them howe ee ought to make, and commonlye to decke youre Ruler, bothe with Tymber and bourde measure.

Ensample,

ADmit the ruler to be. a.b.c.d. well playned, twelue Inches longe, a quarter of an Inche thicke, and two Inches in breadth. Truely it were more commodious, yf it had twoe foote in length. This ruler here imagined but a foote in length, is diuided first in twelue euen partes, called Inches: then euery Inche in halfe, or two equall portiõs: ech halfe in two quarters: euery quarter in foure or two partes at the lattras in this ensample. Then are the fygures placed from .1. to .12. manifestynge the ynches. Thus youre Ruler is redy to receaue the measures which are marked or fygured on youre Ruler thus. And fyrste the Tymber measure as followeth.

YE ſhall reſorte to youre Table of Tymber meaſure, and ſeeke howe many feete belonge to.1. Inche ſquare: there ye ſhall fynde 144. Thys number note, write, or rather graue, where thys fygure. 1. repreſenteth one inche, is fygured as ye maye ſee in the myddes betwen the lyne. e. f. and the lyne of the fygure. g h. Thys doone, reſorte to youre Table againe, and beholde howe many feete and partes 2. Inches ſquare requireth. So ſhall ye fynde 36. foote, which is placed in the next roume left warde, vnder the character. 2. ſignifying two Inches. Thus the reſte, feete, Inches, and partes, founde in your table, vntill you come to the. 12. Inche, where ye ſhall perceiue 12. Inches onely to be ſet in his proper roume. 1 ft. Then ſeeke further in youre Table, what belongeth to. 13. Inches: Lo. 10 ynches and. $\frac{1}{2}$. This muſt be numbred in the lyne c a, from c. which line betokeneth the thickneſs of the Ruler. Make there a lyttle ſtryke vpon that groſnes, euen ouer right agaynſt the meaſure 10. $\frac{1}{2}$ what neede many woordes? Thus doo vntyll ye come to 36. Inches, and that is noted (as the Table of Tymber meaſure ſheweth) righte with 1 ynche, and. $\frac{1}{2}$. from c. No otherwyſe is perfourmed of boorde meaſure, as ye maye beholde ſet forthe by the helpe of this proper Table in the ſquare roumes, beneath the lyne e f. and alſo in the other thicknes ouer lyne b. d.

The backe side of the Ruler. with the Quadrant Geometrical.

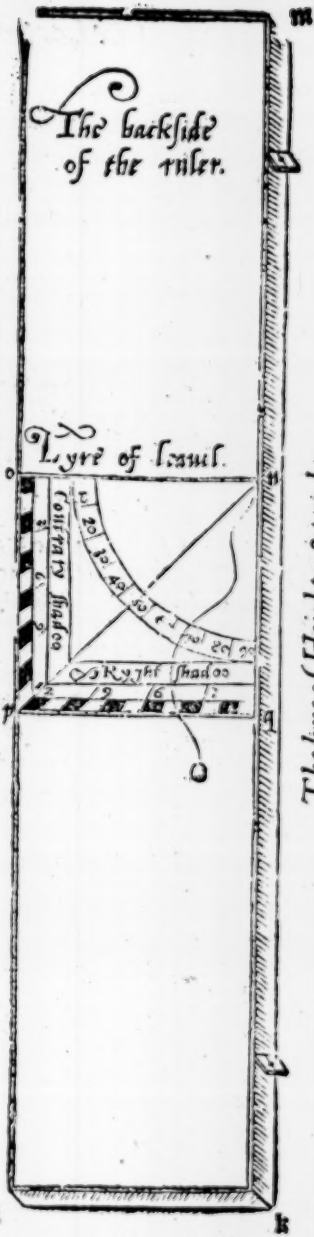
THE XIII. CHAPTER.

The making of a geometricall quadrant.

THis other figure i.k.l m. is, the backsyde of your Ruler hauing in ỹ middes of Geometricall quadrant. n.o.p.q. whose making in few wordes is thus expressed. The line or breadth of your ruler n.o. ỹ lyne o.p.q.n. ought to be of one equall iust length, cutting eche other squirewise. And frō the centre.n. vnto.p. is drawen an other lyne, which in called the line of height. So is.o.n. the lyne of leuell.q n. the Lyne of Heightes vpright. This knowen. I open my compasse, one foote remaynyng in the centre.n. the other extended in the lyne of leuell, almoost to.o making a Circumference vnto.q.n. whiche is a portion of a Circle named a Quadrant: and ought to be diuided into 90. equal partes, as ye maye beholde euery of them called a degree. Ye may deuyde the Lines o p and.p.q. named the Scale, eche in. 12. as here, or in. 60. yea in. 100. equall portions is more mete, for the vse of shadows, Heightes, Lengthes. &c Note that the side or half Scale. o.p. is called the Contrarye shadow. p.q. Right shadow. Remēbre that vpō the thicknesse m.k ye ought to haue two fine equal square sightes, well bored, representeth here by. r.s. made of wodde, or rather metall, to be fastened there when tyme requireth, let this satisfye.

Note these thre principall lines.

The diuided sydes. o. p. & p q. are called the Scale.



The

The commune vse of the Carpenters Ruler, touching the face a fore put forthe.

THE XIIII. CHAPTER.

SUppose a pece of Tymber to be moaten, whose true square is .7. inches thys square appoynted you to the fygure of .7. in the lyne .g.h. vnter whom rightward in the place assigned to Tymber measure, is written .2. foote. 11. ynches, and ⅞. As often as that measure is founde in the length of your Tymber, so many foote of Tymber is in that pece. The. 8. Chapter theweth howe the true square is found.

An other Ensample.

IMagine your square to be .22. ynches seeke in the lyne .a c. Note then how muche of your Ruler is lefte from that, to the ende of your Rule .c. and so much belongeth to a foote. Therfore lay out that measure vpon your Tymber, and recken howe manye tymes ye maye fynde it, from the one to the other of your logge: for so many foote of Tymber is there. Euen thus of Borde. Seke the breadth vpon your Ruler, in the roume or place of borde measure, and immediatly before your eyes there remayneth what is to be layed out to make a iuste foote of borde.

The vse of the principal lynes in the Geometricall Quadrant on the backside of the Ruler, and fyrst of the Leuell lyne.

THE. XV. CHAPTER.

IT behoueth you to loke thorowe your sightes .q.r. placed in the thicknes of lyne .b.m. a fyne threde and plummet fallynge at libertie out of the centre .n. If this plummet and threde chaunce precisely on the lyne of Leuell (whiche is .n.o.) whatsoeuer ye se thorowe the syghtes, is leuell with your eye: if otherwyse, the thing that ye looke vnto is not leuel, eyther more or lesse then the height of leuell of your eye: More yf the plummet fall to youwarde: Lesse if contrary.

How by the lyne of Leuell to forsee whether the water of any springe or head is possible to be brought to a place appointed, and also to iudge the holesomnes of it.

THE XVI. CHAPTER.

E shall go to the head or spryng, and set your Ruler to your eye (being in height equal with the water) so that the lyne coꝛde and plummet fall pꝛecisely in the lyne of Leuell. Now if thoꝛowe the sightes ye may se aboue the place, knowe and iudge the water possyble to be bꝛoughte, yf your syghte fall vnder, impossible. It commeth commonly to passe when the place to the whyche ye wouldе haue water conueyed, is of any great distaunce from the heade, then hylles, valleyes, and suche lyke impedimentes let the lyne vsuall to haue his free course: wheꝛefoꝛe thys remedye is pꝛouyded. At the heade of the spꝛynge, ye shall loke thoꝛow the syghtes (as befoꝛe) and note a marke in the nert hyll toward the place, then go to the marke: in lyke maner obserue there an other in some hyl: so foꝛthe vntill by any of them ye may perceiue the place desyred. If then your syghte runnyng thꝛough the pinnes of your ruler, (the thꝛed euer fallyng on the lyne .n.o.) excede that place, the conueinge of your water is possible, otherwise not. Now by the way bꝛiefely ye shall be instꝛucted how ye maye know the holesomnes of water.

How good water is knowen.

TAke a cleane pot and put water in it: so set it on the fyre: after a litle boiling, peure it out: if then no filth remayn in the bottome of the potte, it may be iudged the holsomer. Or thus: Let fall dꝛoppes vpon metel, oꝛ rather on glasse (any of them being polyshed) and suffer that to dꝛye by it selfe: if after there remayn no spot oꝛ spgne, it is a good token. Moreouer, if your water be swete, pure, clere, lyght, oꝛ of little weight, it foloweth the water to bee holesome for the vse of man.

Of the lyne of Height.

When ſoeuer the thred and plummet do chaũce iuſtly on the height which is n.p. the altitude or height that ye ſee is euen with the diſtaunce from the Middle of your fote to the nether part directly vnder the oppe equall with your ſtandyng, addyng the heighte of youre eye downewarde, Know that ye muſt euer ſtande vpright with body & necke, your fete iuſte together, the one eye cloſed. &c.

The lyne of vpright Altitudes.

Iudge alſo any thyng plãne vpright when the thicknes of your Ruler f.l is cloſely theron, the plummet then at libertie, fallyng on q n. named the line of Heightes vpright. Now followeth the vſe of the Scale.

The ſearch out heightes by the Scale, with the ayde of two places.

THE XVIII. CHAPTER.

Let the threde and plummet fall in the one, on the 12. poyntes: in thother ſtation, on the 6 of the right ſhadowe: double the diſtance betwene the two places the ſummity appeareth from that part of the thing meaſured, which is equal in height with your eye. Or the one in the. 12. the other in. 8. of right ſhadow: the triple the diſtance. The one in the 12. the other in. 6. of right, quadruplate the ſpace. The one in the 12 the other in 6. of the contrarye ſhadow, then the ſpace betwen both the ſtations is equal with that ye meaſure, euer vnderſtanding from your eye vpward Euen that ſame cometh to paſſe if in the one the threde be found vpon the 6. of the contrary, in the other one the. 4 of the ſame, or the 4. and 2. of the contrary: In al theſe the Spaces are equall with the altitudes. So then in meaſurynge the diſtance betwene the two places, ye haue the heighte, from your eye vpwarde, puttyng to it the length from your ſyght downewarde, the whole Altitude appeareth: the baſe being equall with your ſtandynge.

How lēgths in height are knowen

I Wouldenot haue you ignorante here howe to know lengthes whiche be in height not easy to come vnto. Firste (as before (get the height of the toppe, the altitude of the base or longest parte of your lengthe: Subduct the lesse heighte out of the more, of force your desired lengthe remayneth. Or thus: Let the plummet and threde fal in the. 12. marke your place go in towarde the thyng (the threde as it was) vntill ye see the base of that lengthe: the distance betweene the two standynges, is vndoubtedly the lengthe.

How with the Scale, direct or vpright heightes, by their ſhadowes are declared.

THE XIX. CHAPTER.

TVrne your left syde vnto the Sunne, suffering his beames to pearce both your syghtes q. r. placed as afore is sayde in the thyckenes or lyne k m. The threde or plummet then banging at libertie out of the Centre. n. sheweth aswel the degres of height to be compted from. o. as the parts of the Scale cut. If your threde be founde in the 12. parte, or lyne of leauell, shadowes of all thinges beyng perpendicular elevated, are equall with their bodyes. If the plummet with the threde be perceyued cuttyng the partes next to the syghtes, whiche I name pointes of the right shadow, then euery thing direct is more then his shadow, by that proporcion which. 12. exceadeth the partes, where the threde was found. If it fall in. 1. that is the fyrst parte of the right shadow, take the shadow twelue tymes to make the heyght. In two, that is the second parte syxe tymes. In the thyrde foure times: in the fourth, three tymes: in the fyfte, twyse: and. $\frac{1}{2}$. of the shadowe. In the syxte, twyse: in the seuēth once, and. $\frac{1}{2}$. in the eyght once and. $\frac{1}{2}$. in the nynthe once, and. $\frac{1}{2}$. In the tenthe once, and. $\frac{1}{2}$. In the eleuenth ye shall take the shadowe once, and. $\frac{1}{2}$. parte of it.

Right shadowe.

If the arte of numbryng were had, I would will you to multiply the lengthe of the shadowe by. 12. and the product diuide by the partes in the which ye founde the threde.

But and yf it be in the partes of the contrary shadow, augment the

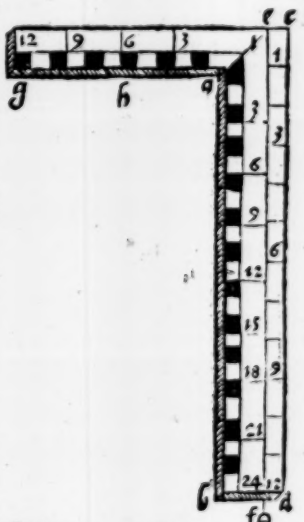
the lengthe of the shadowe with the partes declared by the plummet: and the encrease diuide by .12. so commeth the altitude also.

Thus the composition and whole appliance of the Carpenters ruler is shewed: therfore somewhat shalbe now sayd of the squire. Contrary shadowe.

I am not ignorant that the common vse of him is better knowen then I can with many wordes expresse, wherfore I leaue to write in that behalfe. Notwithstandynge I will declare howe Heightes, & Lengthes are taken, te matters rare, and knowen of fewe Artificers. Also by tables to get a true knowledge of the day houre, and that diuers wayes with the helpe of the squire as is opened in my generall Prognostication augmented in the yere of our Lord. 1556.

VVhat length the sydes of the Squire ought to be, and the diuision of him,

THE XX. CHAPTER.



I Nede not to put forthe the exacte making of this instrumēt so wel knowen. Loe therfore the figure. One syde supposed two fote frō the inward angle: and the other a iuste fote frō the same. The longer a.b. inwardly diuided frō the angle. a. vnto b. into. 24. equal principal partes, & euery of them into a lesse (yf ye list) eche conteyning. 10. minuts. Also the syde. c.d. in the outwarde cōtrary playn frō the toppe. c. vnto d is diuided into. 12. euen portions: and againe (if ye require exactnes) euery of thē into. 6. eche of value. 10. minutes Behold a line & plūmet falling frō e. to f. a parallel to c d. and a. b. Thus this squire is well framed for the vse of diuers tables put forthe in my generall prognostication, and also for the findynge of Altitudes and Rotundides, whiche here I purpose nowe briefly to open.

Howe by the Squire heightes are knowen.

Altitudes or heightes are founde, the line or plūmet centred in the.6. pointe, cuttynge b the middle of a.g. The moueable lightes placed in a.g. or a parallel from that line, not vnlike as is opened of the line of heighte, in the backe of my ruler.

How Lengthes in plaine grounde are searched by the Carpenters or Masons Squire.

THE XXI. CHAPTER.

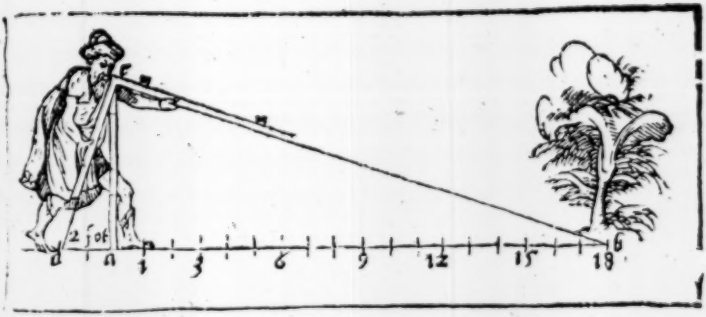
TAke a staffe deuided into certaine portions as ye liste, in, 100. or a 1000. parts. At the beginning of your Length vpon the very toppe directly standyng: sette the inwarde angle of the squire: lift vp or put downe this instrument vntyll ye see the fardest part of your longitude. I meane vntill your sighte runnyng from that angle, to the ende of your squire come vnto the fardest part of that length. The squire so remaynynge, and the staffe not remoued from his height, marke where the other end of the squire next vnto you noteth vpon the grounde. See what proportion the staffe then beareth to the parte of the grounde, whiche the nereste ende of the squire pointed vnto from the staffe, the same shal the Length haue to the quantitie of the sayde staffe.

Ensample,

The cause is taken out of Euclide. 32. pro. 1. boke: and the 4. pro. 6. boke.

THe staffe. a. c. in this figure is imagined. 6. fote, & the space. a. d. 2 fote. Considerynge now that. 6. the lengthe of the staffe conteineth. 2 thrise, therfore the lōgitude desired. a b. of force muste conteyne three tymes the staffe (whiche staffe is. 6. fote,) that maketh 18. foote. As this is proued true by a smal ground in the figure folowing: so the arte falleth not in agreater space, which the good speculator and diligent practiser by anye waye canne not denye. Yet experience willeth me this to confesse, that the squire is not conuenient for any longe distance, but the Instrument Geometrical whose makyng & vse ye may perceiue in the treatise folowinge) vnlesse ye attend some Tree or turret for your ayde, which length knowen shall stande in the steade of your staffe.

It



A Note.

IT behoueth you to haue a fyne coarde, made fast in the vpper parte of your staffe, c. whiche shall be tyed euen with the inwarde edge of the squire, and so drawen to the ground, wher the neare ende of the square from the staffe peynted, as ye see. d. c. the other ende then truely directyng to the fardest distaunce.

Knowe that the grounde must be very playne and leauell, otherwyse errour ensueth.

Thus the vse of the Squire is here somewhat declared, but more in my generall Prognostication, yea moste plentifully here after (God sparynge lyfe) in a booke titled the rare vse of the Squire in practises Mathematicall: in the whiche booke profitable pleasaunt experiences shall be playnely opened (onely of me practised) as well of Perspective, as of the Mathematicals in generall.

I Had thoughte here folowynge to haue placed the readye handelynge of the compasse, yea and to haue shewed the fygurynge and true makynge of all maner letters, bothe Texte and Romayne, with the best proporcion, the quantity as ye would demaund besydes that, so to place them in beyght and nearer to the sighte, ỳ they beyng of diuers magnitudes might appeare to the eye of one bygnes. This when I did attẽpt to bryng to theyr capasitie, semed somewhat difficulte without pennynge many wooordes. Wherfore I omitted it, belongyng rather to the Paynter, then to the Carpenter for whose sake onely the rest afore semeth to be compyled. Here after (as I see men desirefull) my endeuour may be to adde that, and other thinges necessarye.

¶ A litle treatise declaring the making and vse of an Instrument Geometricall, so farre as it fartereth the Landemeter or Carpenter, named the profitable Staffe

TO THE READER.

I Sayde in the beginnyng that no litle booke woulde conteyne the makynge, and manyfolde fruites of this princely Instrument, if it were set foorth as it ought to be. Certes the trueth euen here maketh mee confesse the same: yea, that there is no instrument so generall and profitably pleasaunt. Notwithstandinge knowe (gentle reader) that the occasion of his chiefe vse and profite is not here ministred: neyther (to saye the trueth) doth it apperteine to, or agree with the capacitie of suche Artificers. Therefore I shal leaue to intreate of his ample large vse, and best makyng, and will sette hym foorthe in fewe woordes. yea, sufficiently for the Landemeaters capacitie, or Carpenters purpose, that at the leaste they maye receaue some kynde of fruite with the Geometrer. And in tyme to come (by other meanes) as I see cause I will largely declare, and there declare him with his proper beauties. Here nowe followeth the makynge, and so briefly howe he is applied for the profite of the afore named Artificers.

He that desireth manifold fruites of this instrumēt, legat gēmetricū dera dio astronomico, & geometricolibrum.

The vse of the
The making of this profitable Rodde or Staffe

THE FIRST CHAPTER.

We shall prepare two small, streyghte, slyffe, rounde or rather square Rodes, of mettall or of wodde well playned, of lyke bygnesse and lengthe. Although it make no matter of what lengthe, yet to auoyde the errours, whych lyttle instrumentes and shorte staues bryngе, and also too beare wyth the rude vnwonte handelynge of suche Artificers: let your Rodes be eche fyue, or at the least three fote, and euerye fote diuided in. 12. euen partes or inches, as ye se. a. b. & c. d. These rodes muste bee forged wyth a byze in the ende of them to ioyne readely. 10. or. 6. fote in lengthe, (when time requireth) as the Figure. e. f. sheweth. Also ye muste get) by the helpe of some Crafteſman. 4. other like rodes, the longer g. 2. fote: the nexte. h. 1. fot: the other. i. 6. inches: the. k. 3. inches the last and shortest l. 1. inche. Eche of these must haue in their myddes a hole, that the longe staffe of. 10. fote maye be put thorow them, they moued on hym at pleasure vp & downe, alwayes cuttynge the longer staffe. e. f. squrewise, and made to tary on any diuision as occasion shall be geuen: whiche all are easye to be perceaued by the figure folowynge, although my rude declaration hathe not expressed my meanynge.

Here

Here note in the stede of your shorte Staues, ye maye haue one crosse staffe two fote lōg, with currant sightes, so artificially made, that alwayes the shorte staffe shall runne squire vppon the longer, and the syghtes distaunte, as ye lyst to place them.

Thinges nedefull to be knowen, before the vse of this Instrument is opened.

THE II. CHAPTER.

Before I entreat of his vse, it behoueth to know things necessary and lyst which of the .5. little staues. g. h. i. k. l. mentioned in the makyng, is to be put vpō your long staffe. e. f. accordyng to the distance of the marke. Note if your mark be nere hand, be it length, breadthe, or height, the longer g. doeth seme meetest to haue the roume if more of lengthe, the other. h. and so the farder distance the shorter the staffe requireth to be, whiche shall occupye that place. Mete practyse sheweth thys better then many woordes. Also note, if chaunce be to go in towarde your marke (as after ye shall see how) you must moue the shorte staffe inwarde more neare to the ende of the longer. e. If ye be compelled to go frō it, then put it from. e. toward the end f. Also remember when ye are appoynted to measure any Breadthe or Lengthe (as shal be declared) it behoueth you to stande right with, and against that breadthe, or and the longer the breadth, or larger the wydenesse or length is, the better the thing will come to passe.

If you haue but one crosse Staffe the nerer the distance is, the father the sightes may be pnt the one frō the other

And for heightes it is necessarye (yf ye regarde all practiones) to haue the heyght stande directly vp.

Note this that foloweth to be generall in all workynges.

Ye must stande right vp with your bodye and necke, youre fete iust togethe, your handes not muche mouyng, the one eye closed and euer marke your standynge ryght with the myddes of youre feete. Be not ignorant here, that I call the extreames of the lyttle

Things necessary to be knowen.

tle staues, the very endes where the syght euer runneth. And no difference betwene the altitude and heighte, betwen the longitude and length: the latitude and breadth. The shorte staues I name by the letter figured ouer them. Your eye must euer be placed in the end of the longer staffe c. and with the other eye, ye ought to winke. These trifles and such like omitted letteth the truth to com to passe and make men to suspect the Ground, whiche is most certayne.

VVhat these wordes meane Longitude, Latitude. Altitude.

Howe heightes standing directly vp, are measured by the Instrument

THE. III. CHAPTER.

PVt the staffe. g. vppon the longer e. f. and moue hym bis iust lengthe from the beginninge of the longer. e turne the endes of. g. towarde and accordynge to that heighte: placynge your eye (as is sayde euer at the begynnynge of the longer. e. with thother eye wynke. Then go backe vntill ye maye playnely perceiue the very vpper part of that altitude, and also the lower ende, by the extreames of your shorter staffe. g. Nowe the space from the middle of your fote to the base of the heighte, is equall with the altitude.

Or thus: whē ye shal see any altitude, whose measure ye require, imagine by coniecture howe often tymes that heighte is founde in the space from it vnto youre standynge. Then moue youre shorter staffe, (chosen as aboue moste conueniente) euen as often his owne lengthe, from the begynnynge of the longer e. where your eye is euer placed. This done. turne thendes of your lyttle staffe, your eye beyng in. e accordyng to the heyght: loke whether ye maye see by the extreames of your shorter the verye toppe, and also the lowest parte of the heyghte. If not, moue the shorter a lengthe further towarde. f. or nearer to. e. as ye see cause, and as youre coniecture failed. Or let your lyttle staffe remayne, as by coniecture he was put, and go towarde or from that heighte, vntill the altitude agree iustlye with the extreames of your shorter Staffe. Then marke that place euen with the myddes of youre fote.

Nowe ye maye conclude, that the heyght is as often conteined

in

in the diſtaunce, whiche is betwene your marke and it, as the Lengthe of the lyttle Staffe is founde remoued from the ende of the longer. &c.

Enſample.

IF the ſhorte ſtaffe be ten tymes his owne lengthe from.e. affirme the heyght to be conteyned in that diſtaunce. 10. tymes onely.

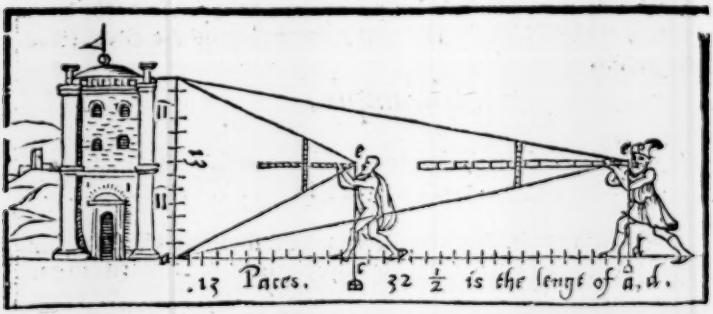
The Altitude is thus gotten. Moue your ſhorte Staffe from his latte beynge, a lengthe eyther towarde or from.e. as ye lyſte to goe in or backe Then go fro or neare vnto it (as afore) vntill the verye ſummitie, and alſo the loweſt part of the height agree with the extreames of youre ſhorter ſtaffe. The ſpace then betwene your firſt marked place, and this later, declareth the iuſt height. Howe the iuſte height is knowen.

Oftentimes thorow impedimentes, ye ſhall not haue rowme to go ſo farre backe or forward. as the heyght cometh vnto. This remedye is prouided. A remedye prouided for want of ground.

Moue the little ſtaffe halfe hys lengthe, and ſo ſeke two ſtacions (as afore) vntill the extreames of the ſhorter ſtaffe be founde iuſtely to anſwer eyther ende of the height. Then the ſpace betwene the two ſtandynges muſt be doubled to haue the iuſt height. Or if ye lyſt, ye maye moue the ſhorter, accordynge to the fourth parte of hys lengthe, or to any portion, as to the fyft, ſyxte, twenty. &c. then ſhal ye haue that parte of the height, betwene two ſtacions.

Yet know thys (which experience by diligent practiſe wyll ſhew) the bygger partes ye take, the leſſe errour ye commyte. A lyttle errour often multiplyed, encreaſeth to a great.

Nowe that all the afore ſpoken maye the better be perceiued, be holde the enſample enſuynge, as ye ſee by figure declared, in the which the height is imagined. a b. the fyrſt ſtacion. c. the ſhorte ſtaffe g. is moued from.e. iuſt his length. I am forced to conclud, that the Baſe of the heighte. a b. is from my ſtandynge c. euen hys preciſe length. So then if ye meaſure that diſtaunce of. a. c. beynge. 13. paces, ye haue the true heighte of a. b. as many In the other ſtanding place. d the ſhorter ſtaffe is founde from.e. twyſe his length and a halfe: wherfore I muſte affyrme the heyght. a. b. to be conteyned or founde in the diſtaunce. a. d. twyſe and a halfe, which length. a. d. is apparant. 32. pacis ½. All this that is ſpoken of the heyght, may well be vnderſtand of Latitudes or Wideneſſes, & Lengthes folowing. The ground of this may be gathered of Euclude in his perſpectiue. 21. Theo.



Howe the breadth or wydenes of thinges are found, and by them, Length, or any diſtance, at pleaſure.

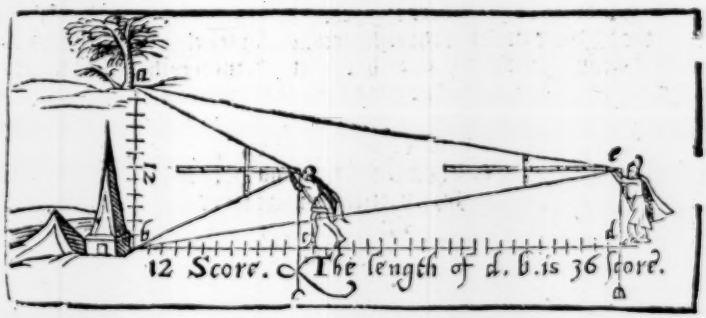
THE IIII. CHAPTER.

WHatſoeuer I haue enſtructed afore of Heightes, the ſame vnderſtande here of Wydenes, Lenghtes &c. For none otherwyſe are Latitudes or Wydenelles ſearched by thys inſtrumente, then before is declared of Heightes, onely thys excepted, that the ſhorte ſtaffe muſte lye contrarye, thendes acrordynge to the breadth, ſeynge by the extreames of the ſhorte ſtaffe, the very vttermoſt partes or endes of the Latitude, notynge youre ſtacions right with the myddes of the fote. And ſo perfourme al, as tofore. And as I ſayde, thereof the partes of the Heighte found betwene your ſtādynges, even the ſame thynge is well vſed here, for all maner partes of the breadth.

Enſample.

THe breadth in this fygure folowyng is ſuppoſed a.b. alſo the fyrſte ſtacion. c. the nexte. d. My deſyre is to know the wideneſs a.b. and the lengthe or diſtaunce. d.b. Marke howe the endes of the leſſer ſtaues are turned to the extreames of the Wydenelle. Then behold howe the ſhorte ſtaffe in c is but once his Lengthe remoued from. c. Wherfore (by the inſtructions of Heightes afore) ye may boldely ſay, that the Wideneſs. a.b is but once cōteined betwene

twewe.b. and. that measure is founde. 12. score, as muche is the other.a b. In the seconde standynge. d the lyttle staffe is remoued three tymes his lengthe from.e. For that cause I cõclude(and truely) from.b. to that station three tymes the Breadth, which breadth is 12. score. So by the Wydenesse I haue found the Lengthe of. b. d 36. score, my desyre. Thus are Latitudes founde, and by them Lengthes. &c. Beholde the figure.



Whensoeuer any distaunce is put, whose certayne length ye require: measure(by the art expressed) either the Heyght of any thing there found, or the Breadth, and see how often tymes that Wydenesse or Length is conteined vnto your standyng: which knowen, the Length can not be hydde, as is declared.

NOwe in fewe wordes to conclude, ye may by this instrument measure the distaunce of Houses, Steples, Trees, the length of Walles, the breadth of Dytches, Imagis in beight, & such lyke. The good witty Carpenter standyng in a place wher he may playnely see a whole house, or any maner frame, with greate pleasure may by this get speadely the true proportiõ of that house, which he ought to note in a table, and when tyme commeth, not with out hys great prayse, may make, reare, and set vp the lyke. Thys I take to be sufficient for these Craftesmen.

A more larger vse of this Instrument.

IHaue before forgotten to admonyche you, whensoeuer ye lyste to measure any lande exactly, by the Instrument Geometrical named the profytable Staffe. to set vpryght a Rodde, the lengthe of a Pearche. Or if the distaunce be long, to passe out, or rather sutlye

How the lẽgthe of lãde is exactly founde.

lye meate fyue or moe Pearches at the end or head of your length, the extreames noted with two visible markes: Then goo frome thence and seke ẏ Length by that certaine Wydenesse, as is declared: so shall ye not saple to bringe very trus Lande. Note that a lyttle errour found in the Breadthe, ofte multiplied, encreaseth to a great, yea, to an intollerable faulte in the Lengthe, therefore the Breadthe or Wydenesse ought truely to be searched. This I take sufficient for these Craftesmen.

I woulde desyre where my grosse writynges seeme to be obscure, that I were presente the instructoure: for truely a lyuely voyce of a meane speculatour somwhat practised, furdereth tenfold more in my iudgement, then the finest writer.

Farewell.

Accepte my good will,
and loke shortly (if God spare lyfe)
for a profitable increase of
these matters.

Finis.